

# Visualized Medication Management System

**Mrs. S Jyothi<sup>1</sup>, Abhishek R R<sup>2</sup>, Anoop Kumar M H<sup>3</sup>, Deepika H S<sup>4</sup>, Kavana H<sup>5</sup>**

Associate Professor, Department of Electronics and Communication, P E S College of Engineering, Mandya<sup>1</sup>

Department of Electronics and Communication, P E S College of Engineering, Mandya<sup>2-5</sup>

**Abstract:** Health has become a major concern in today's generation. In this world every person is undergoing one or more problems regardless of age, the problem may be related to any parts of the human body. Due to the hectic schedule, forgetting things become the major problem nowadays. So the people or the old age one's forget to take their prescribed pills at proper time. When a people are in high medications, it can lead to confusion, so they may undergo over dosage or under dosage. Medicine reminder helps to the user to regularly track their health conditions even with the absence of the caretaker. Thus this paper is going to help the old age people to consume their prescribed pills without physically in touch with the caretakers. The proposed system becomes a bridge between medical field and technology. This aims in addressing the issue related to medication non-adherence by providing personalized reminders and assisting the users. So the proposed system integrates a camera and MAX30100 sensor has an additional feature, which improves medication adherence and also provides real-time video stream updates and keep track of patient's overall healthcare conditions.

**Key words:** Arduino Uno, RTC module, IR sensor, MAX30100 sensor, Pill box, Servo motor.

## I. INTRODUCTION

In today's generation healthcare becomes a biggest issue, because in this hectic schedule it is very difficult to concentrate on our health as well as our parent's or grandparent's health. We have saying in English that "Health is Wealth", health is a major thing in everyone's life. As we all know when the people grow older there will be a gradual decrease in their physical fitness and memory power. In this modern era, it's challenging to be available all the time to take care about the old age people in the family. Now a days, majority of the family becomes nuclear. The elderly naturally desire independence, but this can be a concern for their children.

Ensuring timely medication intake is crucial for the elder people, especially with the rising prevalence of vascular diseases and diabetes. However, despite over 80% being prescribed medication to be taken 2-3 times daily, 40-60% face challenges in remembering to take their medicine at the right times. So they might forget to take their medicine at proper time or they might take improper medicine without proper dosage. Due to this the patient or the people may undergo over dosage or under dosage.

The senior patient's medication becomes a biggest issue of drug misuse. It is very probable for the patient to forget the intake of medicine at proper time. Specially, who take more number of medicines at the same time which may leads to confusion. Besides, they might take wrong dosage accidentally which may leads to a destructive effect such as death. They have to depend on someone i.e the caretakers or their children to take their prescribed pills at proper time. In certain nations, finding or keeping a caretaker for an elderly person is a highly difficult task. Because keeping caretaker may cost heavy for their children. So, in order to overcome all these problems we designed this system which allows the patient to take their prescribed pills without missing them, which also keep monitoring their health condition regularly.

## II. RELATED WORKS

In this section, we extensively review numerous literature papers to gain insights into the problem, advantages and its limitations.

In this technological era, developing an electronic device can offer an efficient solution to the problem which we have mentioned above. A comprehensive research has been carried out on smart medicine reminder.

Salgia, Akash, Sunil and others proposed to build a smart medicine box using UART and GSM module. But it requires continuous network accessibility. Network accessibility is lacking in numerous regions across the nation. So, this system operates within areas where there is a strong internet connection [1].

Mukund, N.K.Srinath and others designed an automatic pill reminder using microcontroller interface with alphanumeric keypad. This system comprises of LED, Motors, pill boxes etc. Once the first alarm on, the patient has to press the button to get a pill and the second alarm notifies the user to refill the pills again. It shows the need for repeated refills indicates an insufficiency in the system. And also, requires supplementary 12V supply for motor control which costs heavy. So, this device is not a portable one [2].

Bhagyashree and Chandrashekar P designed an automated pill dispenser model. In this model they concentrate on blind and deaf people. This model includes microcontroller, LED and buzzer. On the preset time the buzzer will make a sound so that the blind or the patient can take a medicine. But, in the case deaf people if they are in some work even though the LED is on, deceased individuals are unable to hear the buzzer sound [3].

Vishal Tank and Sushmita warrier focused to build a machine which is helpful to the people in larger scale. This paper introduces a machine designed to offer healthcare in areas where establishing a medical store may be impossible or impractical. So, this machine allows the user to select the medicine and pay the appropriate amount. The amount received is verified by image processing through the help of raspberry Pi. Then the pill will dispense out of the box. But it has limitations that the illiterate people, children or the old age people cannot enjoy this technique. There is a chances of taking wrong dosage, which leads to a destructive effect [4].

Wissam antoun , Ali, Suleiman and other authors Mahaveer penna proposed their intelligence pill Reminder model. In that it consists of microcontroller, buzzer, GSM module etc. They designed a mobile application to notify the caretaker about the medicine intake of patients. If they have taken, the positive message is sent otherwise the negative message will be sent. But the medicine has to refill again and again because they designed a compartment which can store only one tablet at a time [5] [6].

Debashis Biswas, Kausik, Prashanth and others proposed their idea to design smart medicine reminder. In this paper they add some additional features which regularly check an elderly health conditions. The project benefits greatly from the inclusion of pulse and temperature sensors, adding a valuable development to the proposed model. This system not only notifies the medication but also regularly monitoring the senior patient's about their health conditions [7].

Mohammed Abdul Kader, Naeemul Islam and others designed an automated medicine box for elderly people and patients. In this project they used an airtight box to keep the medicine fresh. Here the boxes are connected to different colors of LED. At the prescribed timer the particular LED will glow the compartment. But, it has a limitation that, blind individuals may struggle to identify their medications, posing a significant disadvantage [8].

Shayla Sharmin, Md.Ibrahim and Piash designed an online based dispenser which reminds medicines at specified time via buzzer and light. This model mainly consists of two parts, one is hardware and another one is software. This product is neither cost-effective nor affordable for everyone [9].

To overcome all these limitations, we devise a system called 'Visualized Medication Management System'. The proposed system takes the idea of smart pill reminder to the higher level of improvement. It possesses some extra functionalities that are not included in any other reminders.

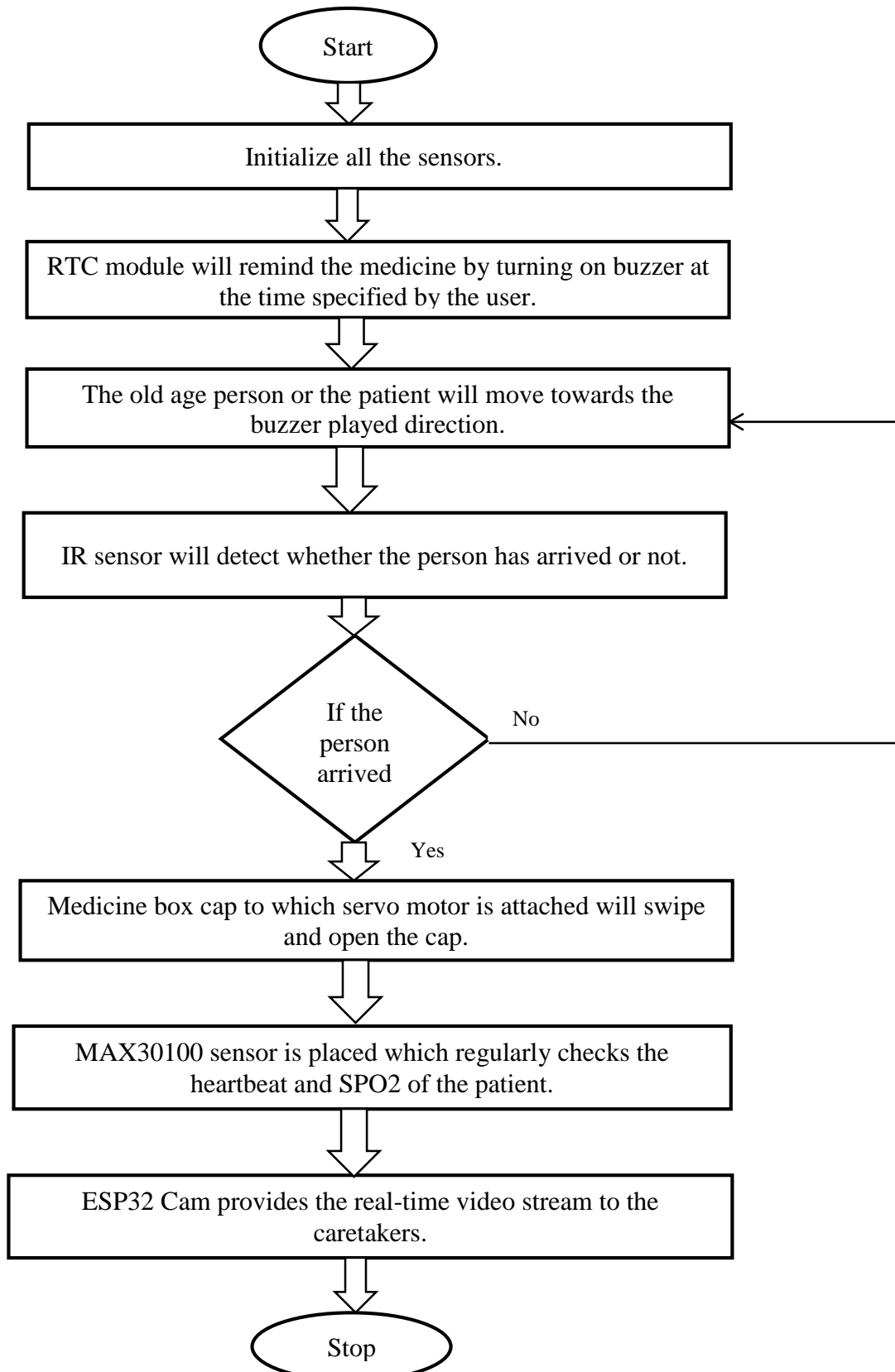
This system includes microcontroller which acts as a central processing unit of this model. RTC module will pre-set the time even when the system is off. Buzzer is incorporated for the purpose of alerting the patient or the elderly people to take their prescribed pills. The arrival of the patient near the medication system is detected by IR sensor. Servo Motor is used for automatically opening the pill box. In addition, we integrate MAX30100 sensor into the system to monitor their health condition regularly. Furthermore, an ESP32 camera is integrated to capture visually appealing images of the patients.

Firstly, the RTC module will send the signal at the prescribed time set by the user to Arduino Uno Microcontroller. The sound produced by the buzzer alerts the patient about the medicine to be taken. The buzzer keeps on sounding till the patient arrives. The arrival of patient is indicated by the IR sensor. If a patient placing his fingertip on the MAX30100 sensor it will provide the values of heartbeat and spo2 of that patient. To clarify their pill intake, we can access the live stream by fetching the camera's IP address.

### III. PROPOSED APPROACH

#### 3.1. Flow Chart

The complete working process of this system is shown in flowchart as:



### 3.2. Block Diagram

A block diagram is a visual representation of a system. Each block represents a specific function and the lines shows how they interact with each other. Fig.2 shows the complete hardware connection of ‘Visualized Medication Management System’. The proposed system consists of Power Supply, Arduino microcontroller, Real Time Clock module, Buzzer, Pill box, Servo motor, various sensors and ESP32 camera.

Arduino microcontroller is the main part of this system to which other components are connected. The adapter or the batteries are used to supply power for this system. The current date and time will be tracked by the RTC module even there is no supply of power. The primary function of a buzzer is to produce audible alerts to the patient. The arrival of person is detected by the IR sensor and MAX30100 is used to check the heartbeat and SPO2 of the senior patients. ESP32 camera is integrated to get live video update of the medicine intake of a patient.

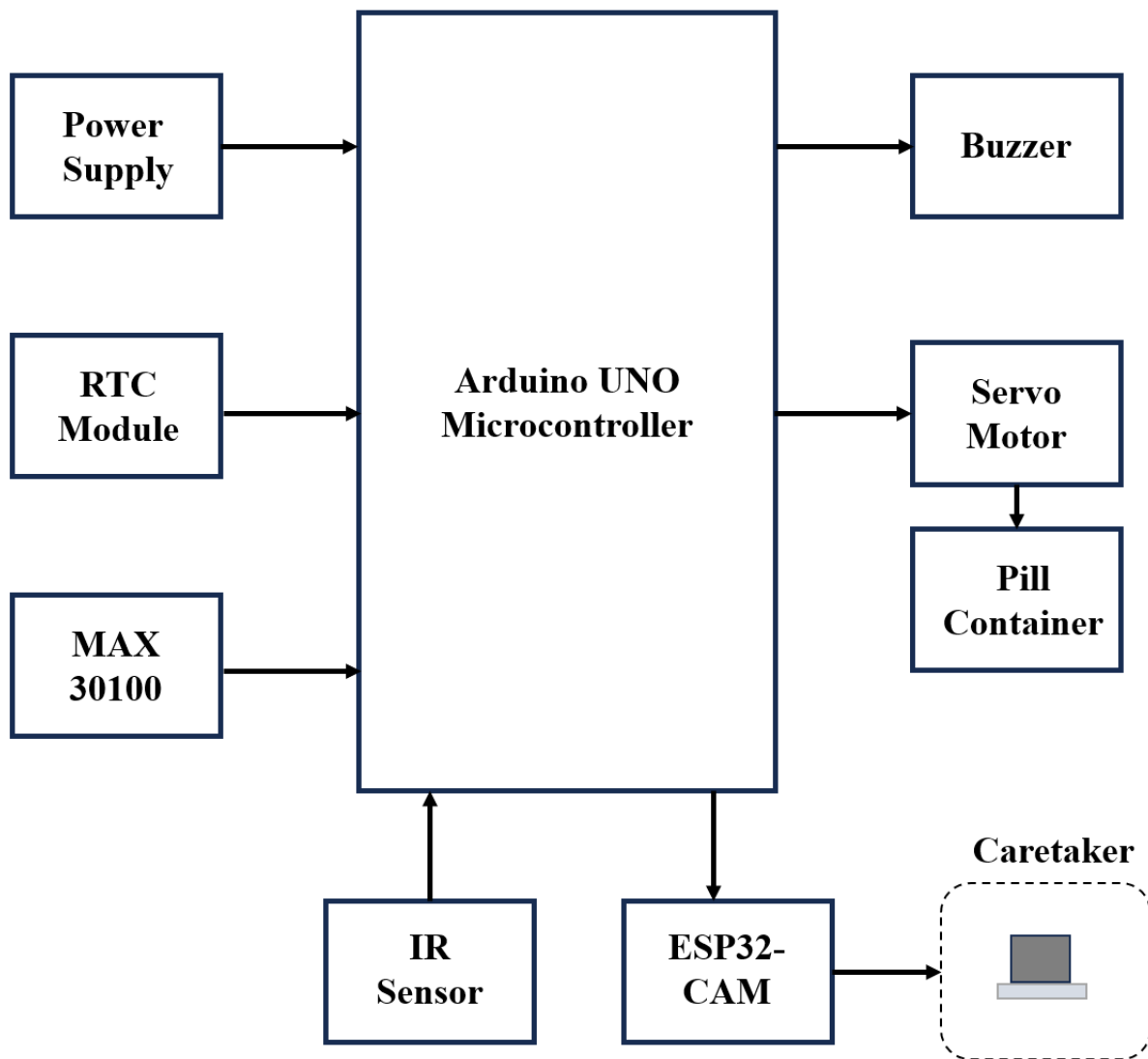


Fig.2. Proposed Approach

In this proposed system, the RTC module accurately keep track of time even when the power of the device is off. The RTC module will send a signal to the microcontroller at the pre-set time designated by the user. Upon receiving the signal from the RTC module, the microcontroller activates the buzzer. Once the patient comes near the system the buzzer will off and the pill container cap will slide off. The caretaker can monitor the patient via a live camera to ensure their adherence to medication. Mainly, in this work we try to build the entire system with low cost and affordable. Fig.3 represents the architecture of the proposed system.

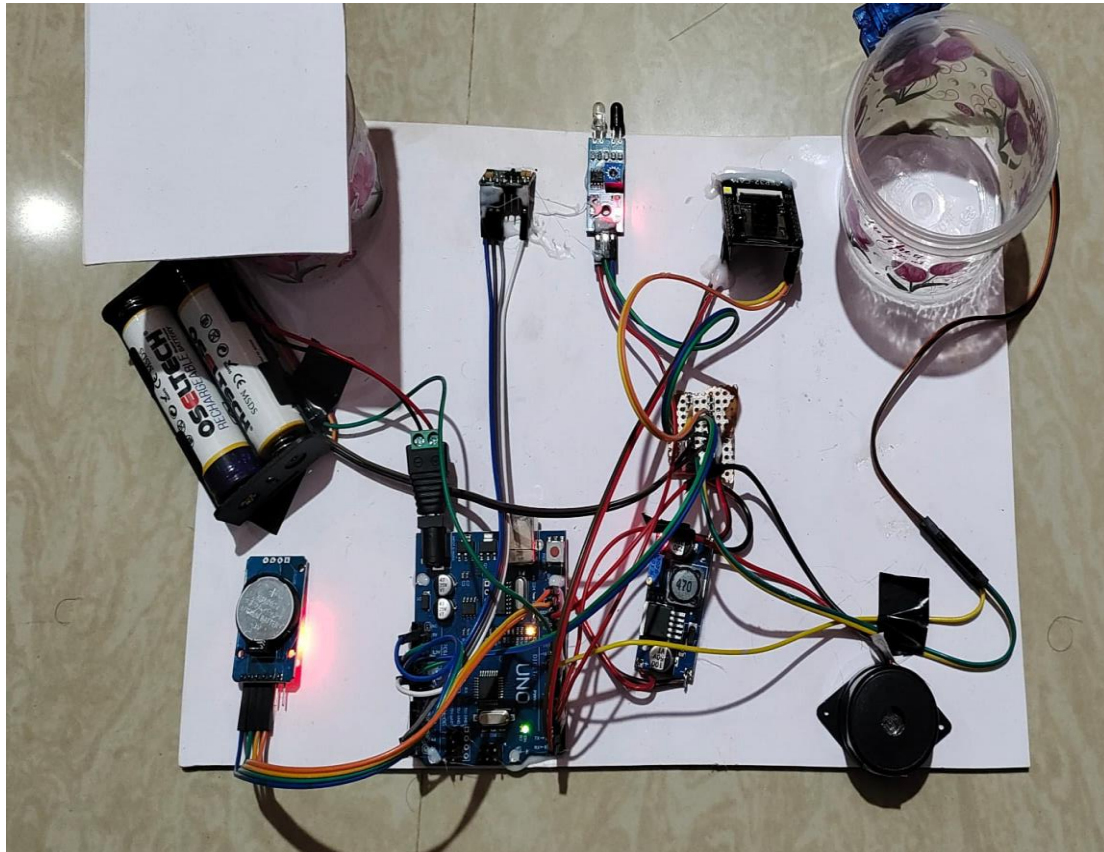


Fig.3. Architecture of the Proposed System

#### IV. CONCLUSION

This paper outlines the key aspects of Visualized Medication Management System project. The main motive of this system is to help the elderly people and the patients to take their prescribed pills on time with appropriate dose and also to improve medication adherence. This system has a great potential to noticeably improve the overall health outcomes and enhance the lives of those navigating chronic health conditions with its user friendly interface having adaptable options.

The main objective of this system is to keep the device simple, user friendly and cost effective with a reliable software, So that the majority population can be benefitted from this device. In this system it is possible programmable to dynamically change the time and medicines.

#### ACKNOWLEDGMENT

We would like to extend our heartfelt thanks to the invaluable support and resources provided by the Project Lab, Communication Lab, and VLSI Lab in the department of ECE, PESCE, and Mandya. Their assistance greatly facilitated the completion of this research and the preparation of this manuscript.

**REFERENCES**

- [1] Salgia, Aakash Sunil K, Ganesan and Ashwin Raghunath “Smart Pill Box.” Indian Journal of Science and (2012).pp.251-257.
- [2] Mukund S and N K Srinath. “Design of Automatic Medication Dispenser.” Indian Journal of Science and (2012).pp.251-257.
- [3] Bhagyashree S R, Chandrashekar P, “Automated Medication Dispensing System” 2015 IEEE.
- [4] Vishal Tank, Sushmita warrier, “Medicine Dispensing Machine Using Raspberry Pi and Arduino Controller,” March 2017 IEEE.
- [5] Wissam Antoun, Ali Abdo, Suleiman Al-Yaman, Abdallaha Kassem, Mustapha Hamad and Chady El-Mou Cary, “Smart Medicine Remainder,” 2018 IEEE 4<sup>th</sup> Middle East Conference on Biomedical Engineering(MECBME).pp.1-4.2018.
- [6] Mahaveer Penna, “Design and Implementation of Automatic Medicine Dispensing Machine,” May 2019 IEEE.
- [7] Debasish Biswas, Kaushik.Y.H, L.Prashanth, Lohith.R, and Vidyasagar.K.N, “Design of Automated Medicine Remainder,” International Journal of Advance Research in Science and Engineering, Vol. 07, April 2021.
- [8] Mohammed Abdul Kader, Naeemul Islam, Mohammed Nayim Uddin, Md. Anisuzzaman “Design and Implementation of an Automated Reminder Medicine Box for Old People and Hospital”, 2018 2<sup>nd</sup> conf. on Innovations in Science, Engineering and Technology(ICISET) 27-28.
- [9] Shayla Sharmin, Md.Ibrahim Khulli Ullah Ratan, Ashraful Haque Piash “An Automated and Online-Based Medicine Reminder and Dispenser”, International Conference on Big Data, IoT and Machine Learning, January 2022 (pp.513-524).
- [10] Dharmoji S, Patil A, Anigolkar A (2020) “Design of Smart Medicine Reminder Box with an Android Application”, International Journal Innovation Research Science Engineering Technology 9:4207- 42